Spin meeting minutes, 10/18/2006

To understand the Orbit Response Matrix (ORM) data taken in last run, Nick used MAD8 to calculate the orbits for two horizontal dipole correctors fired with same strength. The measurement showed that the response in vertical plane (coupling) varies with different horizontal correction dipoles along the ring. As Leif pointed out, the concern about coupling is due to the fact that any extra vertical equilibrium orbit oscillation will eat up the vertical aperture at injection. Qualitatively, the results show the observed phenomena. As shown by the MAD8 calculation, the coupling is mainly due to the non-zero skew quads current and the coupling is enhanced when vertical tune is close to 9. Kevin and Thomas pointed out that the MAD8 requires "couple"mode to calculate quantities related to coupling. Nick is going to redo the whole calculation with couple mode, which includes minimizing global coupling (ΔQ_{min}) with I10 solenoid and skew quads. In response to Leif's question, Mei stated that current ORM analysis tool can not handle coupling.

Fanglei reported the progress on SPINK tracking. For the 15%+5.9% partial snakes, she tracked one hundred particles along the AGS ramp for various vertical emittances and horizontal emittances. The final polarization is linearly dependent on the emittance in both planes. Sicne synchrotron motion is not included in these simulation, there is still spin coherence seen in the tracking for horizontal emittance cases. Although the horizontal resonance effect seems smaller than the observation, a more realistic simulation is to include synchrotron motion. Alfredo also pointed out that SPINK can handle varying ramp speed and varying partial snake strength along the ramp. These would be utilized in the future simulation. Following suggestions last week, Fanglei also compared one particle simulation between real snake field map and synthetic snake (drift sapce, no compensation quads). The polarization level after $G\gamma = 5$ shows that former one get more polarization loss due to presumably orbit ditortion. Mei will do DEPOL calculations to compare. For 10% + 5.9% partial snake, the depolarization happens with ν_y starting as 8.95 but not 8.94 and 8.96. This could be due to the fact that the betatron tune line and spin tune line are touching each other for $\nu_y = 8.95$, the effective resonance crossing speed is slower. A detailed plot of spin tune and vertical tune in this region would be useful. To avoid this situation, one can push the vertical tune into spin tune gap at injection, or to lower it. Haixin pointed out that Keith did raise vertical tune to 8.92 from 8.91 in June. There might be some experimental data related to this effect when we played with the vertical tune before $0+\nu$ and it is worthwhile to look those data.

Haixin